HAWAII EMERGENCY MANAGEMENT AGENCY

CRITICAL SYSTEMS: Vulnerabilities Overview

Hope is not a plan.

Vern Miyagi, Administrator, HI-EMA

TIMELINE & SOURCES:

- SEPTEMBER 2015 – AUGUST 2016: RESEARCH PHASE
  - OVER 50 SOURCES WERE USED TO COMPILE THIS ASSESSMENT
  - EM PROFESSIONAL S
  - PRIVATE INDUSTRY STAKE HOLDERS
  - OFFICIAL REPORTS AND STUDIES
  - EM PLANS
  - WORKSHOP AND FORUMS
  - INTERVIEWS
- AUGUST 2016 – DECEMBER 2016: CONFIRMATION & SOCIALIZATION WITH KEY EM STAKEHOLDERS

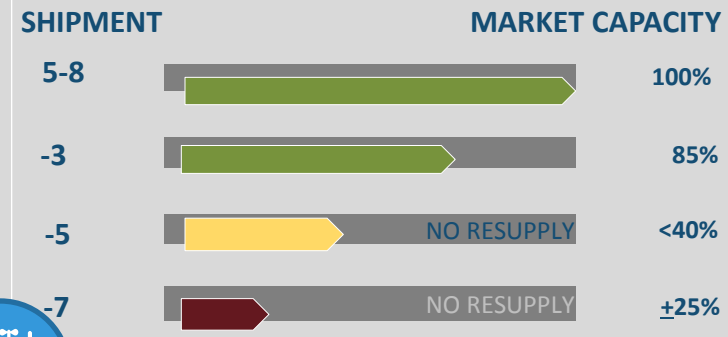
Purpose

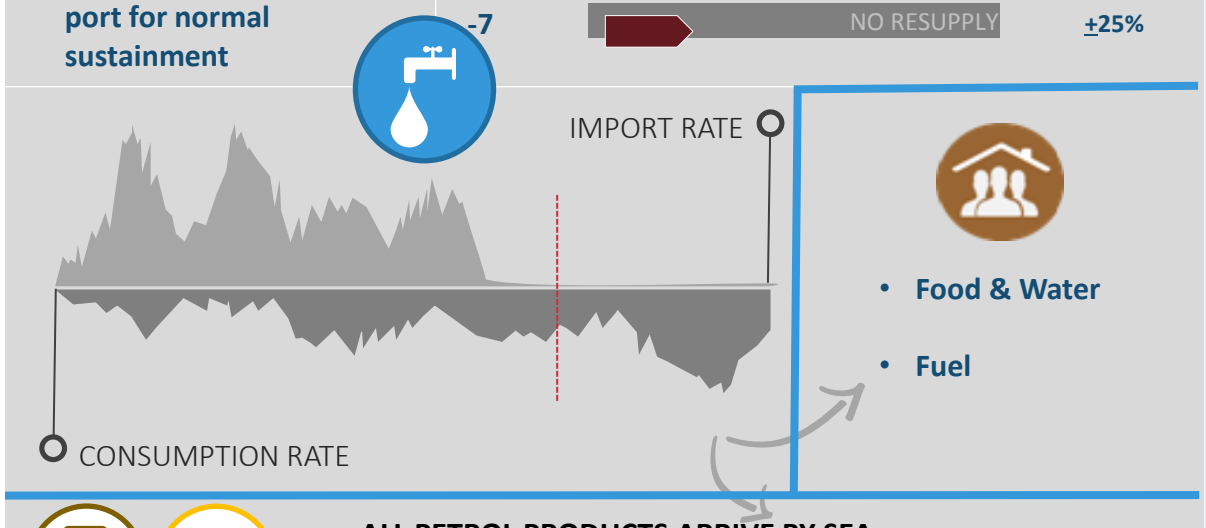
This presentation will provide a brief overview of the vulnerabilities, interdependencies, and cascading effects of a catastrophic event with the purpose of developing a starting point for a basic common operating picture and plan development.

INTERDEPENDENCIES & CASCADING EFFECTS

PORT & ELECTRICAL SYSTEMS

- Market food supply is replenished every 5-8 days.
- 1.1 Million tons of food products/year
- 3013 Tons/day enter the port for normal sustainment





- Food & Water
- Fuel

- ALL PETROL PRODUCTS ARRIVE BY SEA
- SEA CARGO ONLY FOR SOME INDUSTRY COMPONENTS
- WF SUPPLIES

- ALL PETROL PRODUCTS ARRIVE BY SEA (HNL: 4 DAYS)
- WF SUPPLIES
- HNL WF CHAIN IS 20,000 PAX

PoH: is the single Major Supply Point :

- 6-8 day sea log chain + single major supply = Fragile Logistic System
- Every system relies heavily on the port.
- Many systems have equipment that can only be shipped via sea freight

- 3 DAYS OF SURPLUS MED SUPPLIES
- MED SYSTEM RELIES ON THE MARKET FOR FOOD, WATER AND FUEL
- MED SPECIALTIES MAY RELY MORE ON SPECIFIC COMMODITIES
  - IE Dialysis and water

- POWER TO ALL SYSTEMS
- W/O POWER
  - FOOD SPOILS
  - NO ATM'S
  - COMMUNICATION SYSTEMS
  - TRAFFIC LIGHTS
  - NO FUEL
  - MAJOR SYSTEMS SHUT DOWN i.e. AIRPORT, SEA PORT

ASSESSMENT

CRITICAL SYSTEMS

MEDICAL
Performance of life saving measures

SHELTERS
Emergency & Post Impact Facilities

FOOD & H_2O

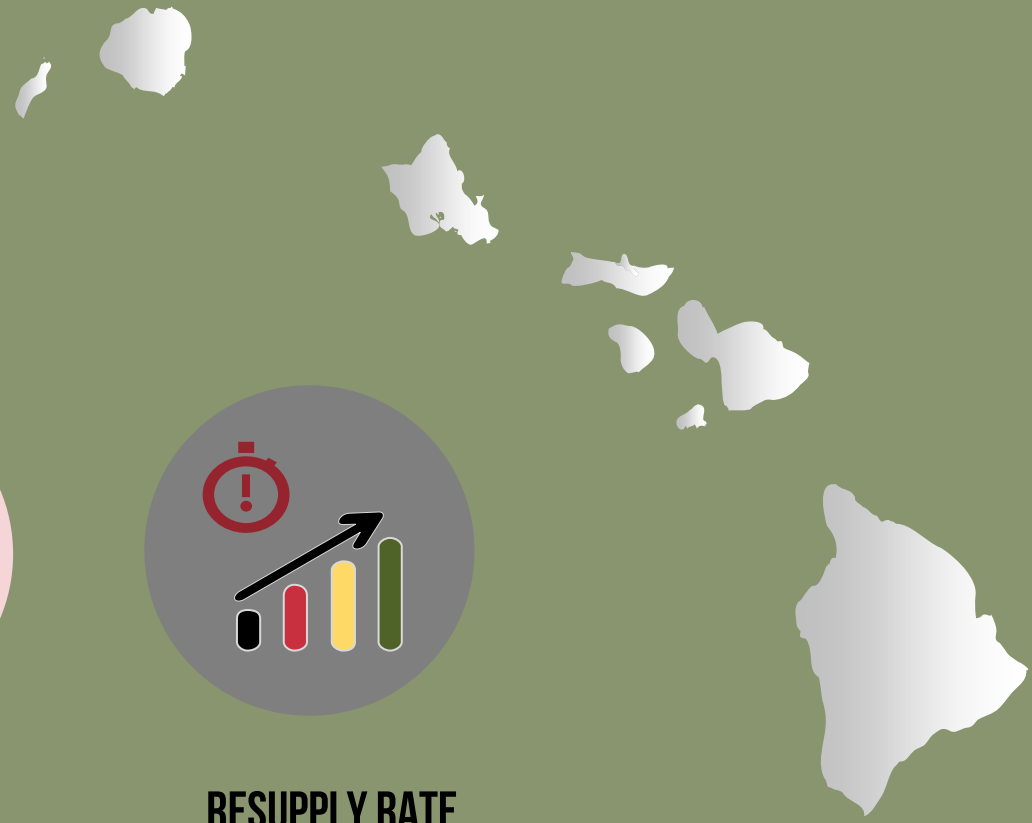
FUEL PRODUCTS

ELECTRICITY

PORTS
Transportation

ASSESSMENT

KEY FACTORS



LOGISTICS CHAIN

ON HAND SUPPLIES

BURN RATE TO CRITICAL

RESUPPLY RATE

DEMOGRAPHICS

GENERAL STATISTICS

RESIDENTS (1.4 M / est 2015)

A. HAWAII		194,190
B. MAUI		163,108
C. OAHU		991,788
D. KAUAI		70,475

14 %

State-wide Homeless Populations

In shelters (private / govt): .3%

Unsheltered: .2%

Source: 2014 Homeless Program Office

35 %

Of the state population will seek emergency shelter

State-wide Children & Elderly Populations

Children < 5 yoa

Elderly > 65 yoa

A)

B)

C)

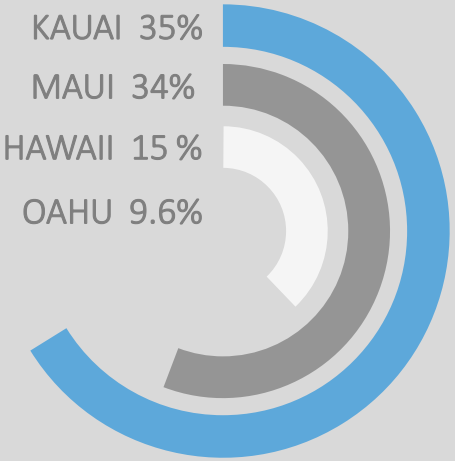
D)

TOURISM

AVG STAY

0 — 9.17 DAYS

Tourists increase total state population by: **15 %**



Approximate average daily visitors (% over resident population) .

Source: US Census Bureau, 2014, and Hawaii Tourism Authority

VULNERABILITY OVERVIEW

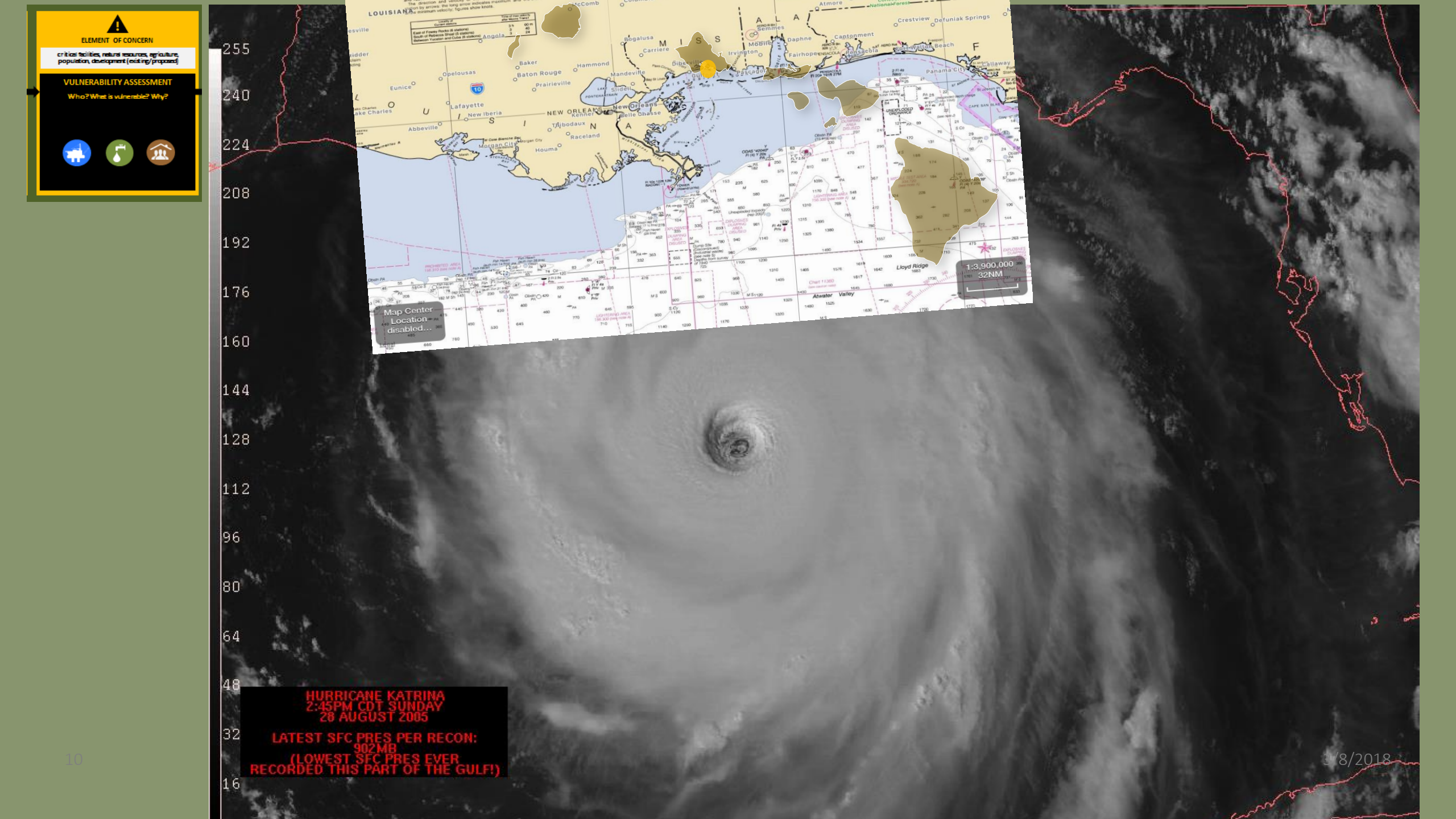
LOGISTICS CHAIN

- Importation of 90% of market goods, 100% of some products
- Long, complex supply chain, up to 14 days to reach market in normal conditions
- Single points of failure / no redundancy in port capabilities
- All major logistic ports are in same general locations and exposed to the same threats
- Air cargo supplies approx. 1% of total cargo importation
- Ports and logistics system move over 14 million tons / yr., off load rate at 42 containers / hr., 3000 tons of food products / day move through the logistics system
- Loss of importation due to port closure for protective measures 48 hours prior to events in some cases
- Rapid depletion of market capacity when sea port closes

VULNERABILITY OVERVIEW

ON-HAND RESOURCES / OPERATIONAL CAPACITIES

- Capacity In all systems is based in on-demand warehousing, not in replenishment of surplus
- No Surplus warehousing of supplies = no emergency surplus
- FOOD/WATER: 5 – 7 days in the state after port closure; after 5 days no importation = 40% of market capacity
- EMERGENCY SHELTER & SYSTEM: Supply can not meet the demand, limited number of hardened shelters
- MEDICAL: 3 Days of general supplies, 7 days of pharma, general WF shortage, high operating capacity
- FUEL: Several single points of failure in the system; 100% reliance on importation through sea logistics chain
- ELECTRICITY: Not a mutually supporting system, 60% power plants in /on inundation zones, limited inventory of components
- PORTS: No large scale salvage / dredging equipment (7-10 day arrival time), alternate port concept not fully realized, airports w/ 4 days of fuel, low cargo capacity vs. emergency delivery


ELEMENT OF CONCERN
critical facilities, natural resources, agriculture, population, development (existing/proposed)
VULNERABILITY ASSESSMENT
Who? What is vulnerable? Why?
255
240
224
208
192
176
160
144
128
112
96
80
64
48
32
16
HURRICANE KATRINA
2:45PM CDT SUNDAY
28 AUGUST 2005
LATEST SFC PRES PER RECON:
902MB
(LOWEST SFC PRES EVER
RECORDED THIS PART OF THE GULF!)
LOUISIANA
Map Center Location disabled...
1:3,900,000
32NM

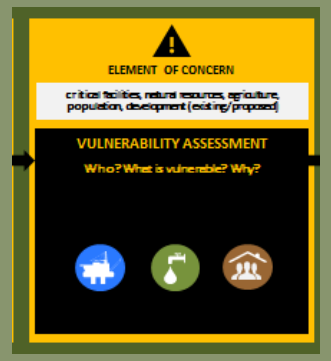


Exhibit 13: Summary of the Financial Effects of Hurricane Katrina on Mississippi's Gulf Ports

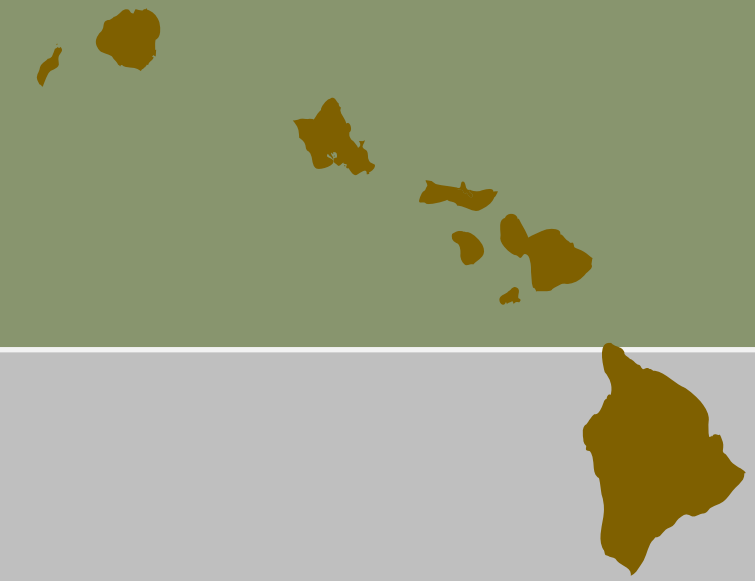
	Pascagoula	Gulfport	Bienville
Asset Value Prior to Hurricane	$65,000,000	$127,573,778	$39,357,106
Decline in Tonnage Post-Katrina as Compared to Tonnage for September-December 2004	69%	69%	Information not available because all of the port's records were destroyed by Hurricane Katrina.
Effect on Staffing	Retained 90% of staff	Retained 100% of staff	Retained 100% of staff
Effect on Revenues	Undetermined	Decreased by 70%	Decreased by 68%
Types of Damage	Damaged drainage, sewer and water supply systems; damaged port buildings, land, and marine structures.	Damaged or destroyed port buildings and warehouses; damaged land and infrastructure improvements.	Heavy siltation of the channel; debris from warehouses and their contents; loading and unloading equipment destroyed; rail lines damaged.
Damage Assessment	$15,729,000	$50,556,175	$33,623,607
Anticipated Source of Funding for Repairs	Insurance and FEMA	Port funds, FEMA, and insurance	FEMA , bank loans, and insurance

NOTE: This table reflects a damage assessment as of January 31, 2006.

SOURCE: Information reported by individual port directors.

VULNERABILITY OVERVIEW

BURN RATE TO CRITICAL



- No system has a long term surplus of materials, spare equipment, or WF (Work Force)
- “Runs” on Emergency Goods deplete supplies at above normal rates
- FOOD/WATER: Critical levels w/in 5 days, 420,000 emergency rations, rapid depletion of market inventory (water first)
- SHELTER & SYSTEM: Critical levels on impact: no support products, overcrowding, failed shelter structures
- MEDICAL: Critical levels of material w/in 3 days of impact, 6x patient increase, 40% reduction of general medical services
- FUEL: Single points of failure: FAIL; inter-island shortages, critical level at 14 days post impact or sooner (contamination / ruptures of tanks)
- ELECTRICITY: Critical level on impact: immediate loss / fluctuating power supply; failed T&D system, 10 days to complete assessment; massive logistical chain to import restorative components; food spoils at 48 hours
- PORTS: High possibility of port closure to channel blockage: FAILURE ON IMPACT; alternate port provides 1/5 of the thru-put with an off load capability of 8-10 containers /hr., accepts 1 vessel for offload

Affected Pier Facilities

ID	Description	Use	Damage Index for Piers and Wharves
0	Pier 1	Pasha Hawaii and International Cargo at Pier 1	Moderate to Major
8	Pier 11	cruise ship terminal; large reinforced concrete warehouse at Piers 10 and 11	Moderate to Major
17	Pier 20	Piers 20 handles general and roll-on/roll-off cargoes, barges, tugboats, water taxis, and barges.	**Complete**
18	Pier 21	Piers 20 through 29 handle general and roll-on/roll-off cargoes, barges, tugboats, water taxis, and barges.	Moderate to Major
21	Pier 24	Piers 20 through 29 handle general and roll-on/roll-off cargoes, barges, tugboats, water taxis, and barges.	Major to Complete
23	Pier 26	Piers 20 through 29 handle general and roll-on/roll-off cargoes, barges, tugboats, water taxis, and barges.	Major to Complete
27	Pier 30	Chevron tank farm adjacent to Pier 30 stores fuel for ships. Reinforced concrete walls with heights of 3, 6 and 10 feet above the pier.	Major to Complete at Pier (not at tank farm)
29	Pier 33	Pier 33 specializes in general, dry bulk, and roll-on/roll-off cargo	Moderate to Major
30	Pier 32	Pier 32 specializes in bunkering, pipelines, and general and roll-on/roll-off cargo	Moderate to Major
33	Pier 35	General cargo, dry bulk, and roll-on/roll-off cargo	**Complete**
43	Pier 39F	Young Brothers at Pier 39 handle containers, breakbulk, and roll-on/roll-off cargoes as well as support barges and tugboats	Major to Complete
44	Pier 40A	Young Brothers; Pier 40 also handles containerized, breakbulk, and roll-on/roll-off cargoes	Major to Complete
45	Pier 40B	Young Brothers; Pier 40 also handles containerized, breakbulk, and roll-on/roll-off cargoes	Complete
47	Pier 40D	Young Brothers; Pier 40 also handles containerized, breakbulk, and roll-on/roll-off cargoes	Moderate to Major
48	Pier 40E	Young Brothers; Pier 40 also handles containerized, breakbulk, and roll-on/roll-off cargoes	Moderate to Major
53	Pier 51A	Horizon Lines at Pier 51 ; Pier 51A also handles roll-on/roll-off cargoes and petroleum	Moderate to Major
54	Pier 51B	Horizon Lines at Pier 51	**Complete**
56	Pier 52	Matson Shipping at Piers 52	**Complete**

VULNERABILITY OVERVIEW

RESTORATIVE RATE

- All systems will have increase work load w/ a reduced work force (30%)
- Two Restorative Considerations across the systems: Daily Operational Demand and Replenishment to “normal” conditions
- 1/5 day ratio for port closure and restoration to normal inventory levels
- FOOD/WATER: Hand to Mouth Resupply for 30 days, expectation of severe shortages until port reopens
- SHELTER & SYSTEM: Expectation of long term sheltering to feel the same stress as general population
- MEDICAL: Hand to Mouth Resupply for 30 days; WF reduction for 30 days, Reduced outpatient services by 80-90%
- FUEL: Restoration is dependent on port opening (resupply of crude or direct import of fuel), shortages expected at 20 days post-impact but could be sooner based on contamination or ruptured tanks
- ELECTRICITY: Expectation on “circuits’ within the grid or some plants to be without power for months; possibility of repair components arrival at 9 weeks post impact
- PORTS: PoH begins opening at 19 days post event, reaching an 75-100% operational capability by 30 days; HNL restores one runway / 3days, by day 12 increase in air power but not enough capacity to relieve the logistical stress on all systems

REFERENCES: PORTS

OFFICIAL REPORTS:

1. 2013 Hawaii Port Resiliency/Recovery Assessment Summary Report
2. 02/2015 HDOT: Vulnerability of Hawaii Commercial Port and Harbor Facilities to Tsunamis and Hurricane Storm Surge and Wave Action, Ian Robertson Ph.D, SE, U of H Manoa
3. 12/2015 Department of Homeland Security: Resiliency Assessment
4. **FEMA Honolulu Harbor Workshop, Summary Report (2016)**
5. 03/2016 Hawaii DoD: HAWAII Port-Wide Risk Management and Mitigation Plan
6. 04/2016 USCG: Sector Honolulu: Laydown Area MTSR Workshop 2016 AAR
7. 06/2006 Mississippi Legislature Report: The Impact of Hurricane Katrina on Mississippi's Ports
8. 08/2017 Tsunami Assessment of the Port of Honolulu: Gary Chock, Martin & Chock, Inc.
9. 01/2018 Seaport Lessons Learned from the Response to Maria: Mike Matthews; USDOT ESF 1

Interviews and Other Sources:

1. Hawaii Ports Handbook
2. MTSRU Meeting Minutes
3. State DOT Meeting Minutes
4. Critical Transportation Core Capability Analysis
5. Section 20 of the River and Harbor Act of 1899 (33 USC 409, 411-415)
6. Interviews with John Manganaro, Port Security Specialist, USCG
7. Airport capabilities interviews with Joint Base Hickam: Dan Dubois, Emergency Management Officer;
8. Airport capabilities interviews with HDOT: Airports: Steven Maruyama, Chief Martinez, Hank Bruckner
9. State DOT Harbors: Planners and USACE Interviews: 8/29/2016

PUERTO RICO IMPACT & RESTORATIVE RATES

(20 SEP Landfall: 12 Days Post Impact)

All systems fail on impact, some fail two days prior to impact due to hurricane force winds, after 5 days EM still in life-saving ops (30 hour spin down)
Plans appear to be non-mutually supportive, systems cannot function independently, unknown requirements, low workforce

No emergency surplus, clogging at ports, no work force

FOOD/WATER: Hand to Mouth Resupply on impact, +6 days post impact 50% need water, temporary water treatment plants, +12 days 65% of grocery stores open

SHELTER & SYSTEM: over 500 shelters opened, evacuate 70,000 pax due to poor dam inspections

MEDICAL: +6 days p. impact: 15% of hospitals open, some day only, deploy USN med ship (+7 days more prep/sail), +8 days 70% hospitals inoperable, status of 8 hospitals unknown

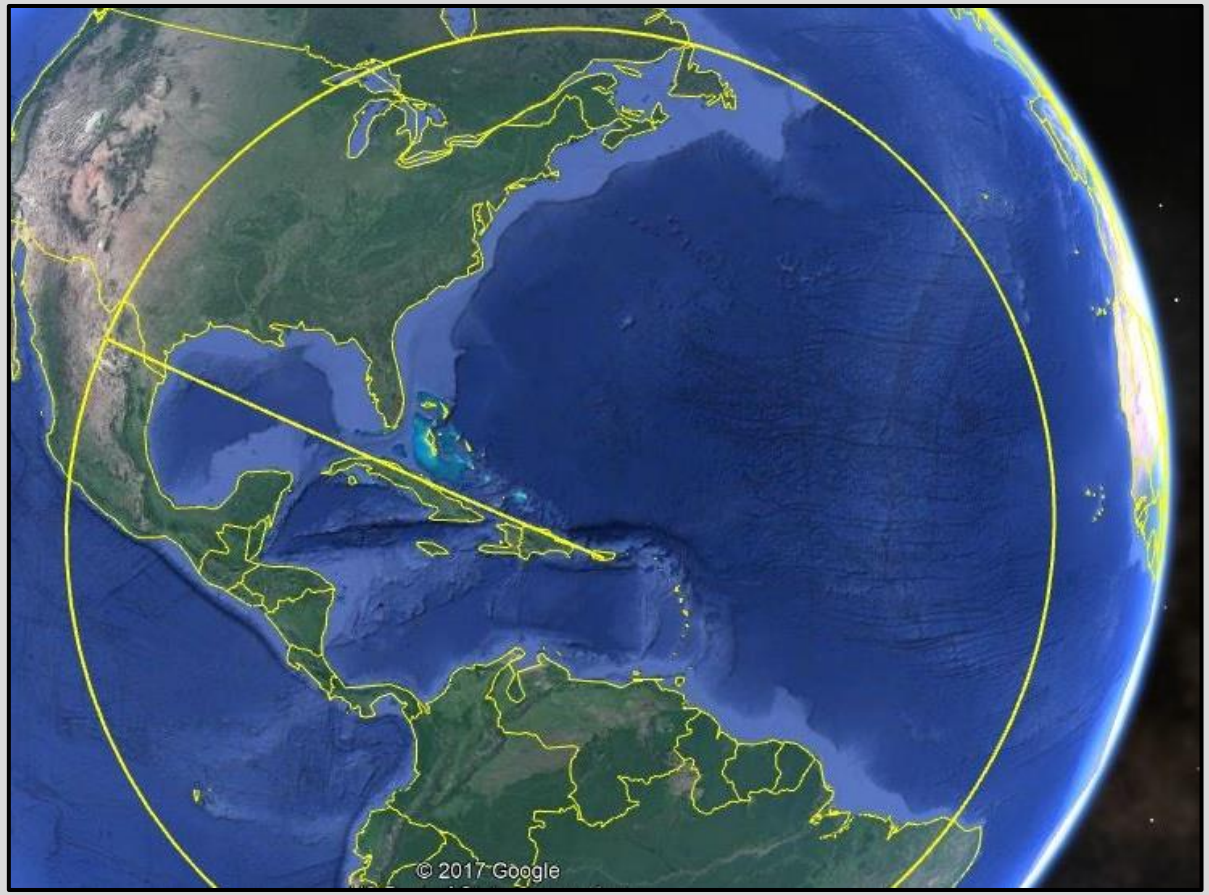
FUEL: +8 days: no fuel for ground transport, 2/3 of gas stations open

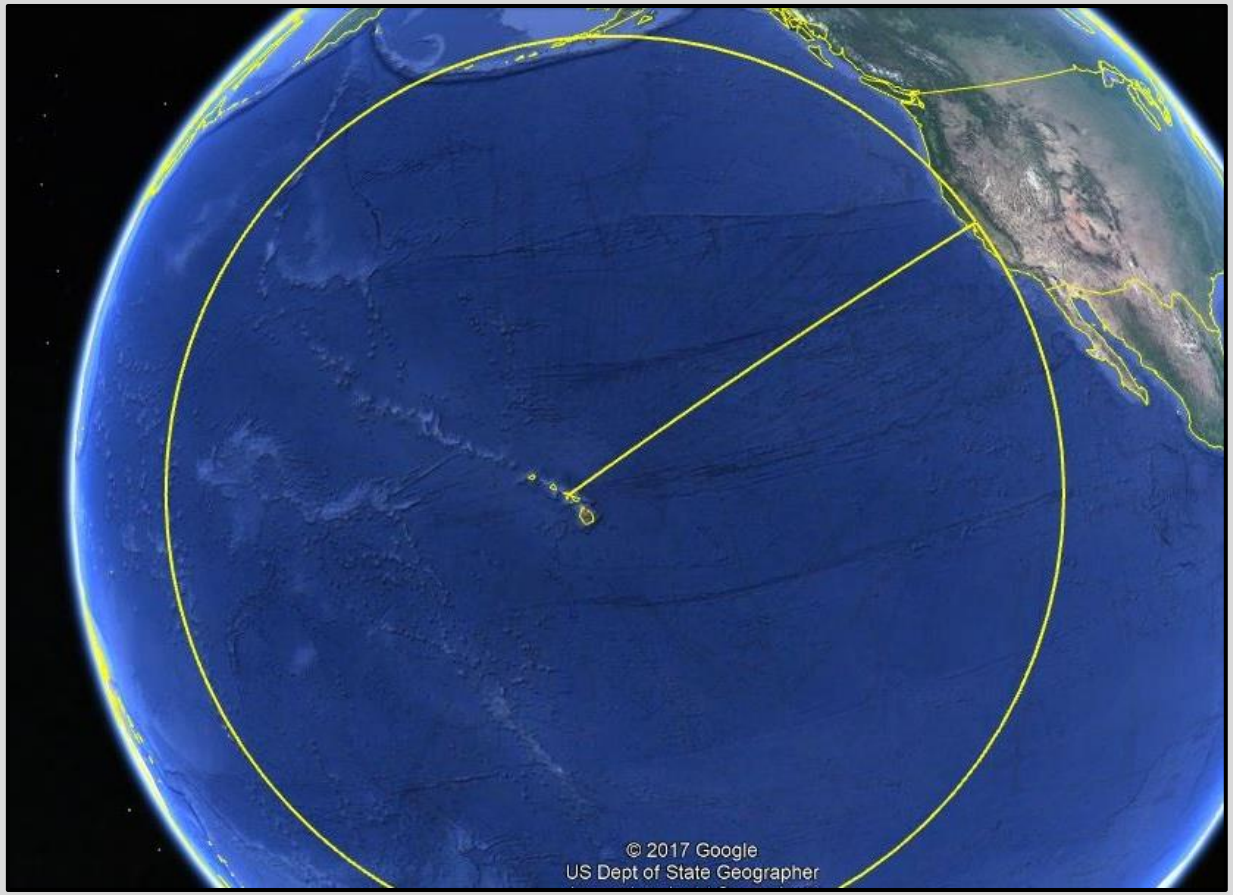
ELECTRICITY: Aging infrastructure already under stress, entire island w/o power on impact, expectation of outages for 6-8 months,

COMMUNICATION: 90% failure on impact, 85% loss of cell towers, +11 days: 1/3 cell service up

PORTS: + 3 days Port (SJ)opens (day only), +7 Mayaguez, others w/ restrictions, ; +2 days Airport opens: mil a/c , day VFR, 100,000 meals / DAY,

SPHERE OF SUPPORT





FUTURE INITIATIVES

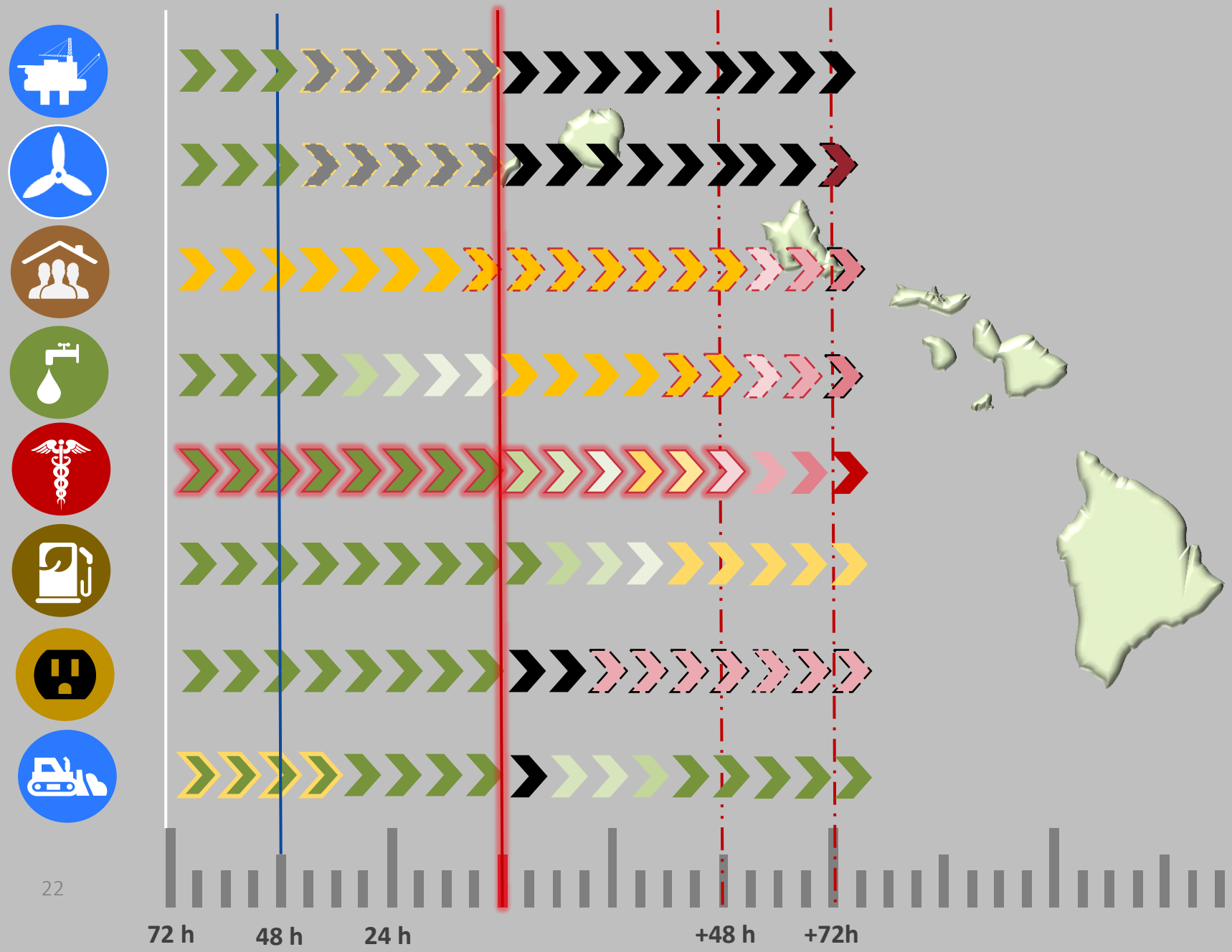
AGENCY INITIATIVES

- 9 Step Resiliency Strategy
  - Holistic Approach
  - Interlocking Strategies
  - Short, Mid, Long Range Goals
- Port Restoration Plan
  - Restoration Task Development
  - Contingency Contracts
  - Alternate Port
- ENERGY : Electricity And Fuel
- Shelter & Mass Care
- Debris Clearance

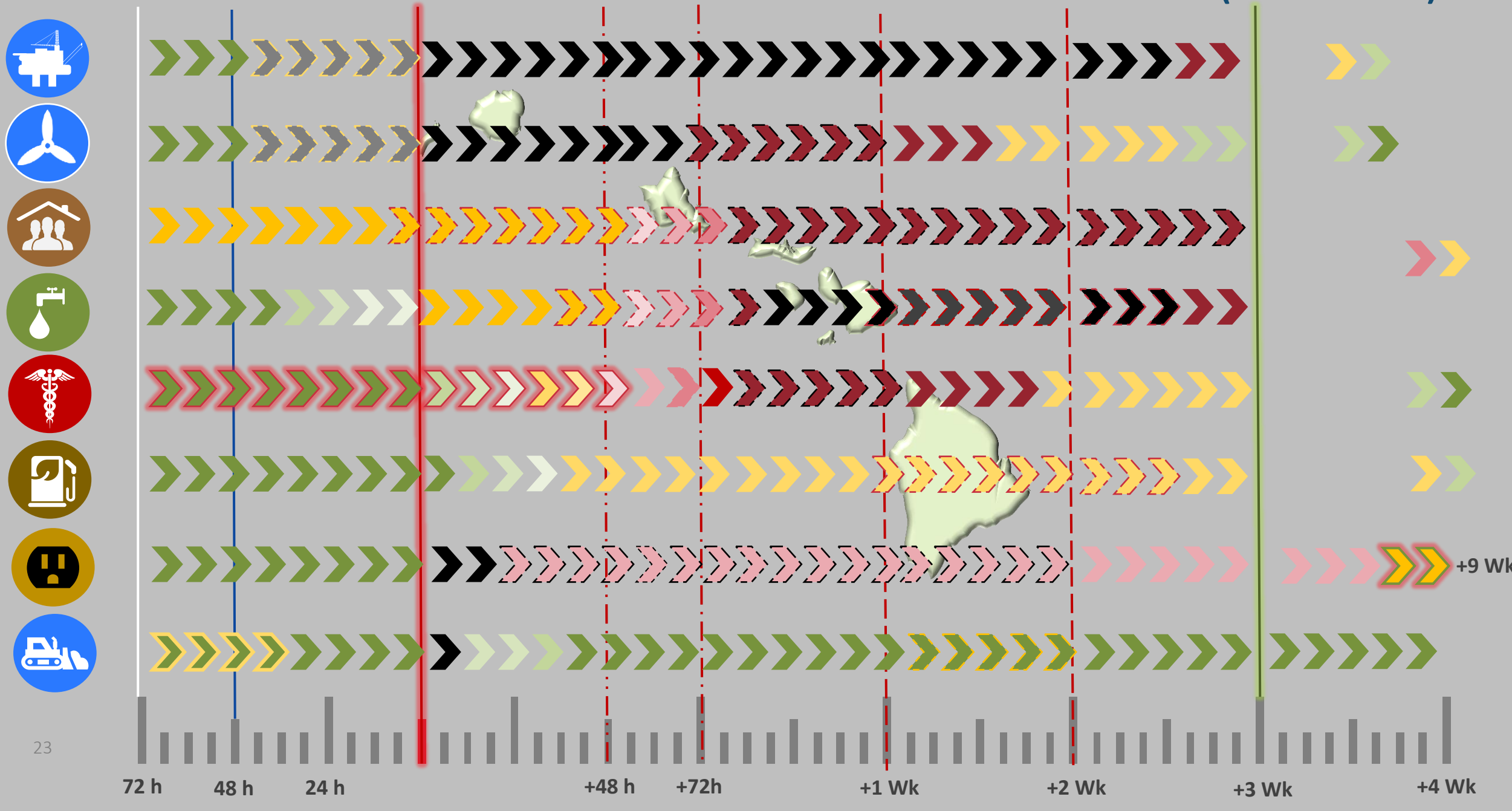
EXECUTIVE & LEGISLATIVE SUPPORT INITIATIVES

- COMMISSION A MARINE TRANSPORTATION IMPROVEMENT STUDY
- IMPROVE STATE DEPARTMENT READINESS
  - STRENGTHEN 127A TO ADDRESS GENERAL DEPARTMENT EMERGENCY MANAGEMENT RESPONSIBILITIES & REQUIREMENTS
  - Require All Departments to have Back-Up Power and Communications Capability
  - Require Emergency Planners in All Departments with Primary Duties in Emergency Management planning, coordination, and mitigation
- STATE WIDE REQUIREMENT FOR DEPARTMENTS AND OTHER ENTITIES TO COORDINATE EM INITIATIVES THROUGH HI-EMA
  - Address EM Priorities
  - Efficiency
  - Resource Management
  - Reduce Duplication of Effort

CAT EVENT TO +72 hrs (Phase 2a)



CAT EVENT TO +2 Wk (Phase 2a-2b)



2015 HAWAII CATASTROPHIC HURRICANE PLAN

Risk Assessment and Reduction: Planning considerations that have not been previously or adequately addressed in the CAT PLAN.

HAZARD INFORMATION

past incidences: maps, factors affecting occurrences

HAZARD ASSESSMENT

What are the hazards? What severity? What return periods?

ELEMENT OF CONCERN

critical facilities, natural resources, agriculture, population, development (existing/ proposed)

VULNERABILITY ASSESSMENT

Who? What is vulnerable? Why?

SITE AND FEATURE CHARACTERISTICS

specific damage/ loss estimate, physical suite characteristics, structural strength, content exposure

RISK ASSESSMENT

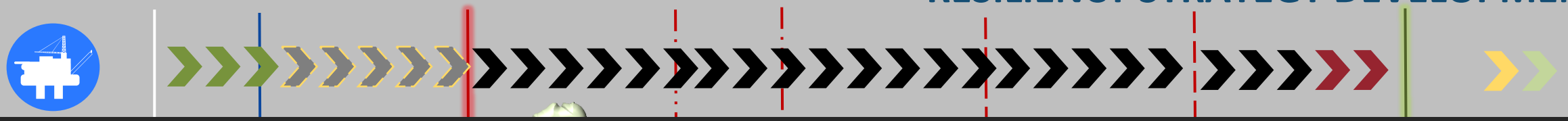
What is the expected degree of loss?

IDENTIFICATION OF RISK REDUCTION OPTIONS

ECONOMIC ANALYSIS OF RISK REDUCTION OPTIONS

FORMULATION OF DESIRED RISK REDUCTION STRATEGY

RESILIENCY STRATEGY DEVELOPMENT



1 HAZARD / SYSTEM IDENTIFICATION

Identify the hazard with highest probability of occurrence and produces the most damage. This sets the order of precedence in addressing hazards.

2 CAPABILITIES ASSESTMENT

Conduct an assessment of the facility or system; to include the capabilities of continuation and sustainment of function post incident.

3 "GAP" IDENTIFICATION

Determine the gaps based on the assessment. The quantity/quality of sustainment, length of sustainment, and equipment necessary to continue functional sustainment.

4 RESILIENCY STRATEGY

Focuses on reducing the time a system is inoperable or in a critical state to its return to 75-100% of its functionality.

5 RESILIENCY PLAN

Plans and actions that are enacted prior to the catastrophic event. These plans and actions are designed to reduce the level of loss to the system during impact.

6 RECOVERY PLAN

Plans and actions that are enacted post impact with the goal of repairing the system to a functional level as rapidly as possible.

7 INSTITUTING THE STRATEGY

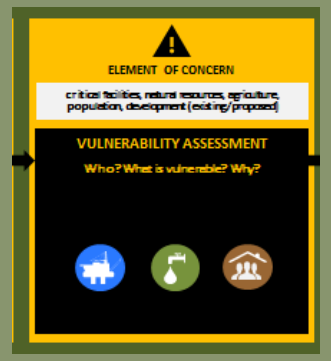
Modern systems are complex and interdependent. It may take a combination of programs to reduce a specific "gap" in a system.

8 FUNDING

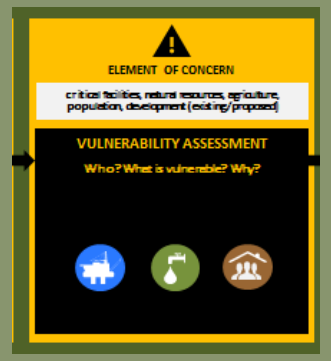
Resiliency programs are expensive and time consuming. Immediate solutions may be unaffordable. Short term fixes may have to be incorporated into long term solutions with multiple funding sources.

9 MAINTENANCE/INSPECTION

Insure there is maintenance and/or inspection process to insure these investments are sustained and ready when needed.



- Single Point of failure: Port of Honolulu
- Heavy salvage & dredging equipment is 7 – 10 days away
- Alternate port concept provides 1/5 of the cargo off load capability of normal operations
- A/C in fair weather provides 1% of cargo importation
- **PORT OF HONOLULU COULD BE DOWN FROM 19 DAYS POST EVENT TO LONGER & MONTHS BEFORE REACHING FULL CAPACITY**



- PoH closure due to storm damage = High chance that HNL will have received storm damage / flooding

AIR BRIDGE CONSIDERATIONS

- LENGTH OF RUNWAY
- WEIGHT RATING OF RUNWAY
- OFF LOAD EQUIPEMENT PER AIR FRAME
- LAY DOWN SPACE
- FUEL CAPABILITIES
- CREW DEMANDS
- CLEARED TRANSPORTATION ROUTES

- COST & AVAILABILITY OF MASS STORES

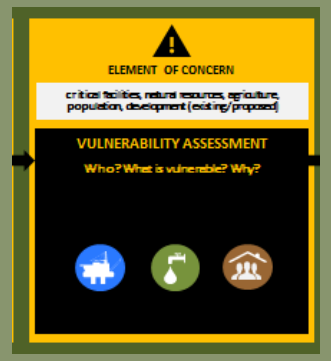
10 PALLETS OF AIR CARGO = 1 SHIPPING CONTAINER BY SEA

AIR 4X COST OF SEA FREIGHT

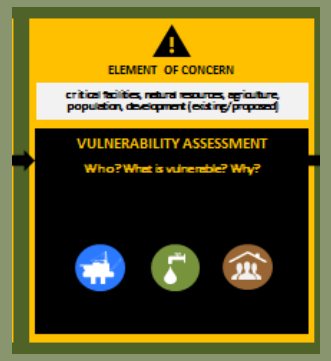
14 DAYS HDR's @ 1 m pax = 275 x C17 @ $1 BILLION

AVIATION GAS

- Single refuel point from PoH
- Cycled shipments to outer islands
- TS DARBY
  - PoH closed for 35 Hours
  - Kauai & Maui were on the tail end of their AVGAS shipping cycle
  - Kauai
    - 1 day of AVGAS remaining
  - Maui
    - 2 days of AVGAS



- Geographic Isolation = long supply chain & one major resupply point
- 3000 + tons of food products / day move thru the state
- Upon port closure, the population possess the food/water supply
- Limited self sustaining supplies
- “Runs” on food/water deplete stores above normal rates
- Limited FEMA supplies
- 72 hours post event food/water have dropped to critical levels
- 5 DAYS OF FOOD/WATER AFTER PORT CLOSES



- Geographic Isolation = long supply chain & one major resupply point
- 3000 + tons of food products / day move thru the state
- Upon port closure, the population possess the food/water supply
- Limited self sustaining supplies
- "Runs" on food/water deplete stores above normal rates
- Limited FEMA supplies
- 72 hours post event food/water have dropped to critical levels
- 5 DAYS OF FOOD/WATER AFTER PORT CLOSES

TS DARBY & WATER SUPPLY

- Run on water started 5 days prior to landfall (Monday, prior landfall)
- In response, a supplier immediately sent 5 shipping containers of water to Big Island
- 20,000 gallons of water, 12,000 gallons over normal
- By Friday, 1 day prior to landfall, the 5 containers were exhausted
- The distributor began moving water via land from Kona side to Hilo side to cover shortages
- PoH closed for 35 hours
- The closure put the distributor 2 days behind schedule
- It took 5 days (Friday following DARBY) for the distributor to return stocks to normal

THE NEXT STEPS:

Risk Assessment and Resiliency Strategy

HAZARD INFORMATION

past incidences: maps, factors affecting occurrences

HAZARD ASSESSMENT

What are the hazards? What severity? What return periods?

ELEMENT OF CONCERN

critical facilities, natural resources, agriculture, population, development (existing/ proposed)

VULNERABILITY ASSESSMENT

Who? What is vulnerable? Why?

SITE AND FEATURE CHARACTERISTICS

specific damage/ loss estimate, physical suite characteristics, structural strength, content exposure

RISK ASSESSMENT

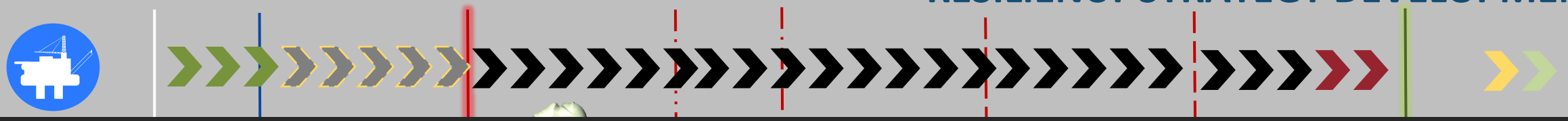
What is the expected degree of loss?

IDENTIFICATION OF RESILIENCY OPTIONS

ECONOMIC ANALYSIS OF OPTIONS

FORMULATION OF DESIRED RESILIENCY STRATEGY

RESILIENCY STRATEGY DEVELOPMENT



1

HAZARD / SYSTEM IDENTIFICATION

Identify the hazard with highest probability of occurrence and produces the most damage. This sets the order of precedence in addressing hazards.

2

CAPABILITIES ASSESTMENT

Conduct an assessment of the facility or system; to include the capabilities of continuation and sustainment of function post incident.

3

"GAP" IDENTIFICATION

Determine the gaps based on the assessment. The quantity/quality of sustainment, length of sustainment, and equipment necessary to continue functional sustainment.

4

RESILIENCY STRATEGY

Focuses on reducing the time a system is inoperable or in a critical state to its return to 75-100% of its functionality.

5

RESILIENCY PLAN

Plans and actions that are enacted prior to the catastrophic event. These plans and actions are designed to reduce the level of loss to the system during impact.

6

RECOVERY PLAN

Plans and actions that are enacted post impact with the goal of repairing the system to a functional level as rapidly as possible.

7

INSTITUTING THE STRATEGY

Modern systems are complex and interdependent. It may take a combination of programs to reduce a specific "gap" in a system.

8

FUNDING

Resiliency programs are expensive and time consuming. Immediate solutions may be unaffordable. Short term fixes may have to be incorporated into long term solutions with multiple funding sources.

9

MAINTENANCE/INSPECTION

Insure there is maintenance and/or inspection process to insure these investments are sustained and ready when needed.

RESILIENCY STRATEGY: PORTS

1

HAZARD / SYSTEM IDENTIFICATION

- Any event(s) causing catastrophic shut down of the Port of Honolulu (PoH).
- Natural Disaster
- Sunk Vessel

2

CAPABILITIES ASSESTMENT

- Major Resupply Point
- >90% of Cargo arrives through the Port
- >90% Aviation Fuel (Pier 51)
- >3000 Tons of Food Products / Day
- Single Point of Failure for Mass Resupply

3

"GAP" IDENTIFICATION

- No salvage / dredge equipment
- 7-10 day travel for all sea leg products
- Possibly 0% capacity for 12-19 days post event to 30 days & 3 months or more at reduced operational capacity

4

RESILIENCY STRATEGY

Combination of methods to strengthen the ports capability to withstand storm damage, hasten operability/recovery, and provide Hawaii with alternate port & logistic capabilities while PoH is being restored. Further compliments the resiliency of all critical systems in the State.

5

RESILIENCY PLAN

- Improve or strengthen protection of infrastructure, superstructure and navigation capability of all ports.
- Develop / improve the shallow water port system (increase capabilities)
- Develop Redundancy to PoH Capabilities

6

RECOVERY PLAN

- Contingency Contract: Supplier, Shipper, Port Designation
- Alternate Port Program / Multiple Hub Shallow Draft Port System
- Second Deep Water Port development

7

INSTITUTING THE STRATEGY

- Stakeholders
- In-depth planning & studies
- Implement projects ASAP
- Concurrent, multi-year projects

8

FUNDING

- Legislative
- Federal Funding & Grants
- Private Industry Partnerships & Vendor Managed Projects

9

MAINTENANCE / INSPECTION

- Professional Project Management
- Continuous HI-EMA liaison
- Legislative Regulations to formalize EM requirements

RESILIENCY STRATEGY: PORTS

1

HAZARD / SYSTEM IDENTIFICATION

- Any event(s) causing catastrophic shut down of the Port of Honolulu (PoH).
- Natural Disaster
- Sunk Vessel

2

CAPABILITIES ASSESTMENT

- Major Resupply Point
- >90% of Cargo arrives through the Port
- >90% Aviation Fuel (Pier 51)
- >3000 Tons of Food Products / Day
- Single Point of Failure for Mass Resupply

3

"GAP" IDENTIFICATION

- No salvage / dredge equipment
- 7-10 day travel for all sea leg products
- Possibly 0% capacity for 12-19 days post event to 30 days & 3 months or more at reduced operational capacity

4

RESILIENCY STRATEGY

Combination of methods to strengthen the ports capability to withstand storm damage, hasten operability/recovery, and provide Hawaii with alternate port & logistic capabilities while PoH is being restored. Further compliments the resiliency of all critical systems in the State.

5

RESILIENCY PLAN

- Improve or strengthen protection of infrastructure, superstructure and navigation capability of all ports.
- Develop / improve the shallow water port system (increase capabilities)
- Develop a second deep water port off Oahu

6

RECOVERY PLAN

- Contingency Contract: Supplier, Shipper, Port Designation
- Alternate Port Program / Multiple Hub Shallow Draft Port System
- Second Deep Water Port development

7

INSTITUTING THE STRATEGY

- Stakeholders
- In-depth planning & studies
- Implement projects ASAP
- Concurrent, multi-year projects

8

FUNDING

- Legislative
- Federal Funding & Grants
- Private Industry Partnerships & Vendor Managed Projects

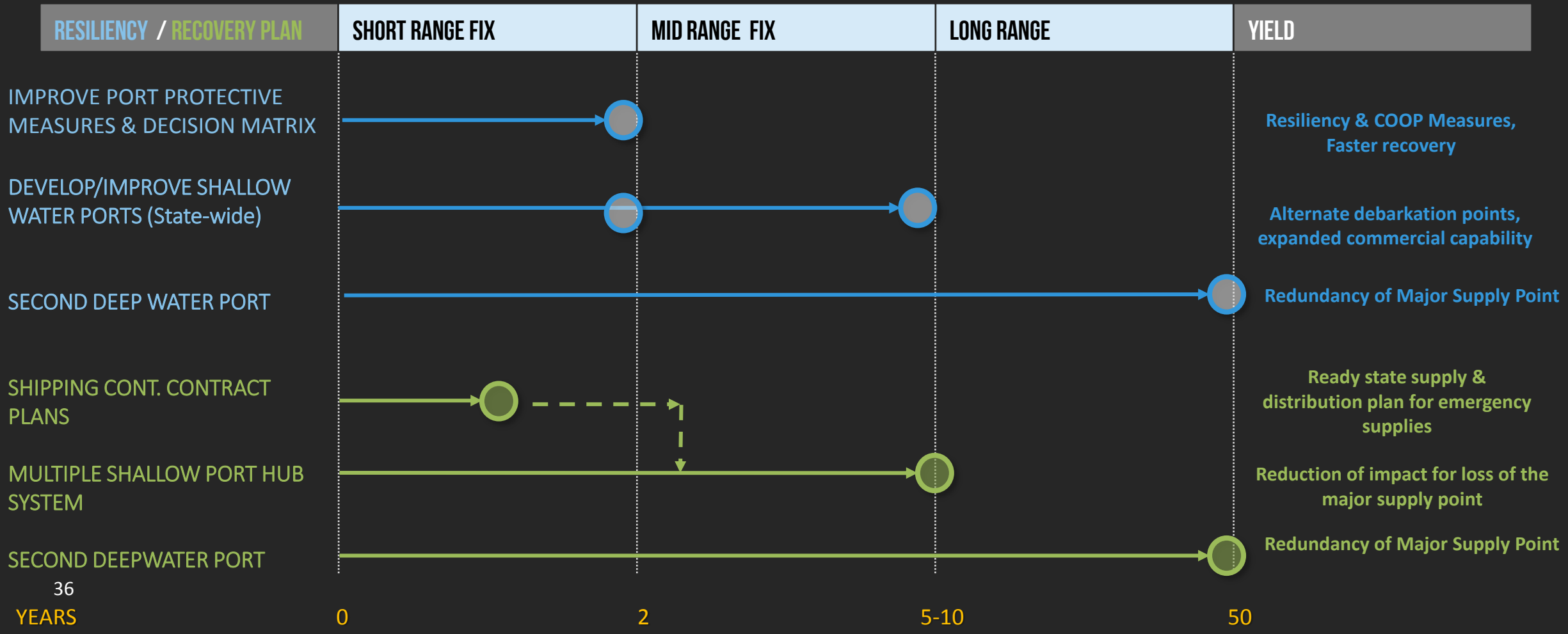
9

MAINTENANCE / INSPECTION

- Professional Project Management
- Continuous HI-EMA liaison
- Legislative Regulations to formalize EM requirements

RESILIENCY STRATEGIC TIMELINE: PORTS

Port of Honolulu / Ports: Overarching goal is to increase the Port of Honolulu's ability to withstand a catastrophic event and decrease the recovery time of the major supply capability to under 14 days.



RESILIENCY STRATEGY: FOOD & WATER

1

HAZARD / SYSTEM IDENTIFICATION

- Food & Water
- Logistics (Other commodities)

2

CAPABILITIES ASSESTMENT

- PoH Major Resupply Point
- >3000 Tons of Food Products / Day
- Limited FEMA HDR's
- Limited self-sustaining resources

3

"GAP" IDENTIFICATION

- Geographic Isolation / Long Supply Chain
- NO emergency stores / Market only
- High probability of no supplies beyond 5 days
- No plan mitigating supply/warehouse factors

4

RESILIENCY STRATEGY

Combination of methods to mitigate the effects of the long supply chain and port closure. The focus is to improve on-hand food and water supplies throughout the State. This further compliments the Resiliency Strategy for all critical systems.

5

RESILIENCY PLAN

- Citizen & Pri. Bus. Incentive Programs for E-rats
- State supplement of E-rats (EM Workers)
- FEMA increase of E-rats
- Vendor Managed Inventories of emergency oriented commodities and the State's E-rat supplies

6

RECOVERY PLAN

- Contingency Contract: Emergency Food
- Develop Post Impact Feeding Plan
- Improve County POD plans
- Comprehensive distro plans: Hub system, caterers, schools and others.

7

INSTITUTING THE STRATEGY

- Stakeholders, CDA, Private Industry, NGOs
- Use existing VMI models
- Implement projects ASAP
- Concurrent, multi-year projects

8

FUNDING

- Legislative
- Federal Funding & Grants
- Private Industry
- Vendor Managed Projects

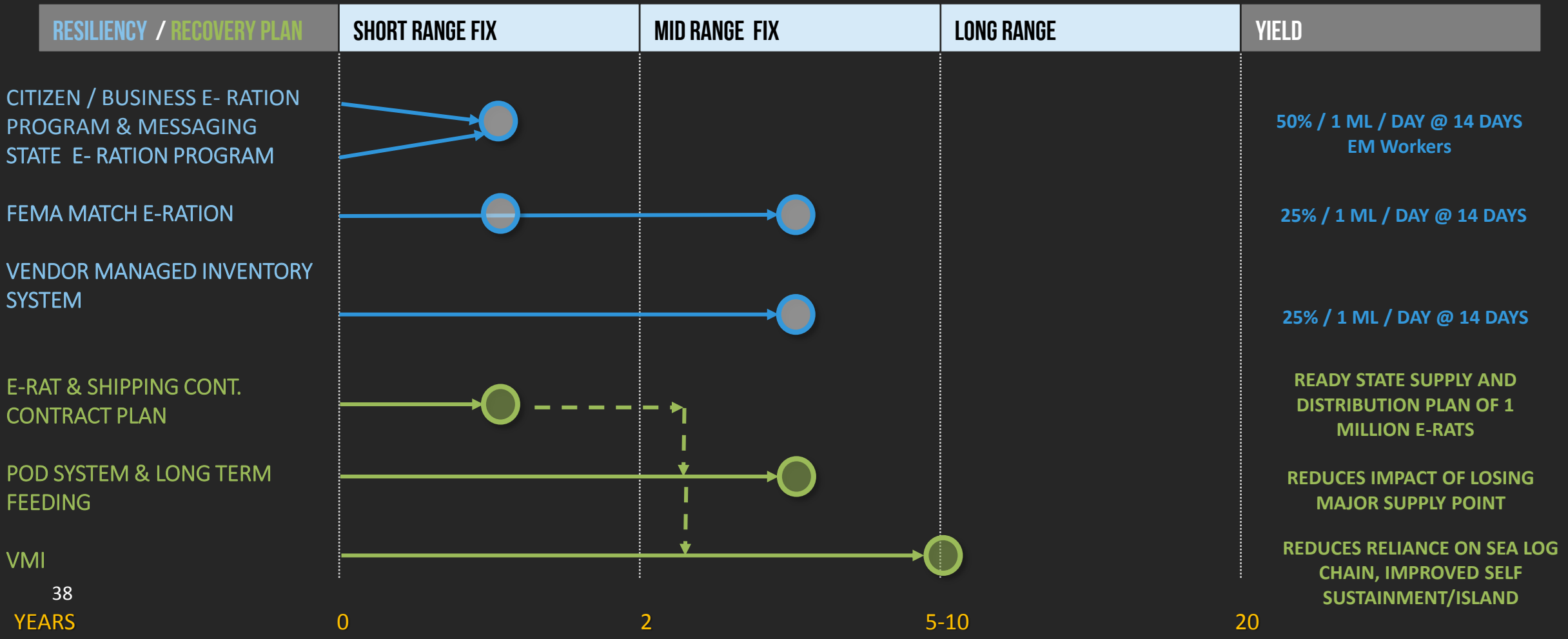
9

MAINTENANCE/INSPECTION

- Professional Project Management
- Continuous HI-EMA liaison
- Legislative Regulations to formalize EM requirements

RESILIENCY STRATEGIC TIMELINE: FOOD & WATER SUPPLY

FOOD & WATER SUPPLY RESILIENCY: Overarching goal is to increase the food supply in the state by incorporating a Resiliency Plan and Recovery Plan extending the "critical need trigger" from 72 hours post impact to 14 days post impact for 100% of the population.



RESILIENCY STRATEGY: SHELTERS

1 HAZARD / SYSTEM IDENTIFICATION

- Emergency Evacuation Shelters
- Post Impact Shelters (Long Term, Recovery)

2 CAPABILITIES ASSESTMENT

- DoE: Primary source of Hurricane Evac facilities
- Hurricane Retrofit sole method of increasing emergency evac shelter space
- Staffing & Equipment is under development
- **Population demand for shelters exceeds the State's supply of viable evac shelters**

3 "GAP" IDENTIFICATION

- No program to increase shelter space
- Retrofit Program is a seasonal fix
- No Identification of Post Impact Shelters
- **No Strategy that attacks the comprehensive issue of sheltering.**

4 RESILIENCY STRATEGY

Develop a multi-prong, multi year approach to increase new shelter space, retrofit existing space and reduce the general population's need to shelter in government facilities; thereby, enabling the State to focus more of its limited resources to its most vulnerable populations.

5 RESILIENCY PLAN

- Retrofit Program refocus on quality vs. quantity
- Citizen retrofit / saferoom incentive programs
- Private business programs (Hotels, Condos)
- Improve Building Codes / New CIP
- Alternative Shelter/Community Saferooms

6 RECOVERY PLAN

- Identify existing facilities for long term / post impact sheltering
- Improved use of HMGP
- Legislature requiring cooperation with HI-EMA for CIP projects and EM requirements

7 INSTITUTING THE STRATEGY

- Stakeholders: Legislature, County EM, NGO's & private sector
- Implement projects ASAP
- Concurrent, multi-year projects

8 FUNDING

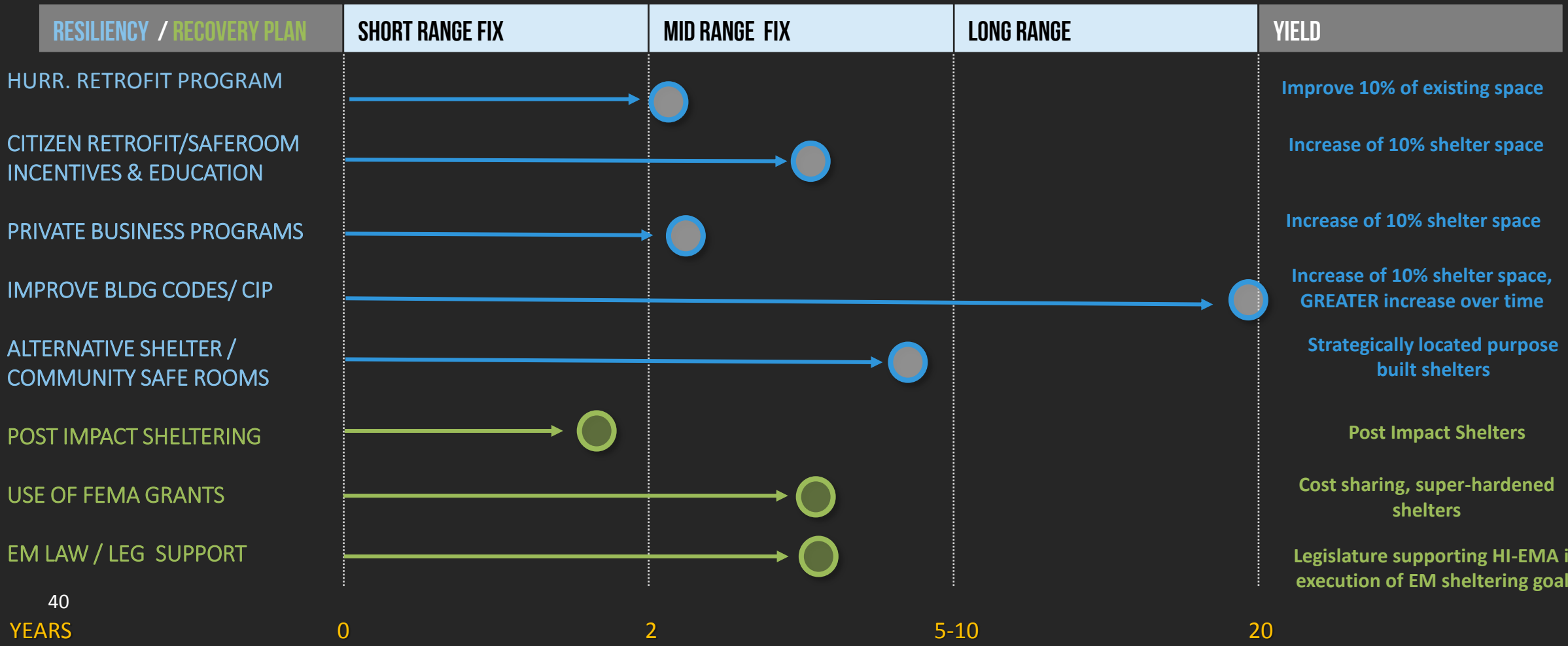
- Legislative
- Federal Funding & Grants
- Private Industry

9 MAINTENANCE/INSPECTION

- Professional Project Management
- Continuous HI-EMA liaison
- Legislative Regulations to formalize EM requirements

RESILIENCY STRATEGIC TIMELINE: SHELTERS

SHELTERS: Overarching goal is to increase "hardened shelter space" by using a multi-prong approach that adds new shelter space to the inventory while reducing the population that requires shelter, thereby reducing the amount of shelter space needed and better using sheltering resources for the most vulnerable populations.



HISTORIC FEDERAL RESPONSE TO PUERTO RICO

★ ★ ★ ★ ★

Since Hurricane Maria's landfall, Puerto Rico is faced with the longest lasting power outage affecting the most people in modern U.S. History, with 3 million people without power for over 30 days.

Longest sustained air mission of food and water in FEMA history	50 days and counting
Largest air mission in FEMA's history	1,119 sorties and continuing
Largest commodity mission in FEMA history	37.6+ million liters of water, 28.4+ million meals and continuing
Largest power mission for the 249th Engineer Battalion on U.S. soil	470 generators installed, 955 generator assessments completed
One of, if not the, largest disaster medical response missions ever	1,172 medical personnel deployed, 37,045 cared for (as of 7 p.m. Nov 7)
One of, if not the, largest disaster housing missions in FEMA history	
The largest sea-bridge operation of federal disaster aid in FEMA history	

UPDATED 8 NOV 2017

FEMA

Statistics
Progress in Puerto Rico

Hurricane Maria Update

Signs of recovery

	1 DAY	30 DAYS	45 DAYS
Cell service	5%	61%	92%
Potable water	44%	69%	83%
Patients cared for in hospitals by federal workforce	--	6,100	33,165
Open ATMs	114	1,047	1,160
Generators	10	148	423
Gas Stations	40%	78%	84%
Power	0%	21%	41%
Installation of Blue Roof	0	439	5,975

# of days after Maria made landfall

FEMA

HURRICANE MARIA
FEDERAL RESPONSE TIMELINE
SEPT 17 *through* SEPT 30

SEPT 17

Federal Coordinating Officers, Incident Management Assistance Team, and Dept. of Defense Civil Authority Information Support Element are on the ground.

Dept. of Defense & US Army Corps of Engineers personnel deployed to support Irma response efforts will ride out the storm on the USS Kearsarge.

SEPT 18

Emergency Disaster Declarations for Puerto Rico & the US Virgin Islands.

FEMA + federal personnel co-located with the Governor on St. Croix, & liaisons in St. John & St. Thomas, as well as with the Governor of Puerto Rico.

2 Type 1 FEMA Urban Search & Rescue Teams in Puerto Rico.

SEPT 19

1 Type 4 FEMA Urban Search & Rescue Team & 1 Canine Team Arrive in Puerto Rico.

Dept. of Health & Human Services deploys 1 Disaster Medical Assistance Team to Puerto Rico.

SEPT 20

Maria makes landfall.

Major Disaster Declarations for Puerto Rico & the US Virgin Islands.

SEPT 21

3,500+ federal, civilian, and military personnel in Puerto Rico & the US Virgin Islands.

2 FEMA Urban Search & Rescue Teams in Puerto Rico.

Air support & assets from ships USS Kearsage & USS Oak Hill begin performing search & rescue flights & aerial damage assessments.

SEPT 22

4 FEMA Urban Search & Rescue Teams in Puerto Rico & 1 in the US Virgin Islands.

Vessels with commodoties awaiting port opening & clearance.

Temporary power installs & 100 generator inspections completed in Puerto Rico & the US Virgin Islands.

SEPT 23

USS Kearsage & USS Oak Hill providing resources for search & rescue flights, aerial damage assessments, & logistics support.

SS Wright carrying 1.1 million meals & 1 million liters of water to the islands.

Defense Logistics Agency transporting 124,000 gallons of diesel fuel to Puerto Rico with more on the way.

SEPT 24

Dept. of Defense Area Support Medical Company re-inserted to US Virgin Islands to assist with medical support needs.

7,000 federal, civilian, and military personnel in Puerto Rico & the US Virgin Islands.

SEPT 25

8,000 federal, civilian, and military personnel, including more than 700 FEMA staff, in Puerto Rico and US Virgin Islands.

FEMA Urban Search & Rescue Teams saved or assisted 516 individuals.

Power is re-established to Centro Medico Hospital in San Juan & San Pablo Hospital in Bayamon, Puerto Rico.

The Schneider Regional Medical Center mobile hospital in St. Thomas was re-established.

US Dept. of Health & Human Services & Dept. of Defense conduct medical evacuations for more than 100 patients from the islands to the continental United States.

SEPT 26

US Coast Guard identifies eight ports with some restrictions in Puerto Rico, and nine open in US Virgin Islands with restrictions.

SEPT 27

HURRICANE MARIA
FEDERAL RESPONSE TIMELINE
OCT 1 *through* OCT 14

OCT 1

All airports in Puerto Rico open or open with restrictions.

US Northern Command conducting 11 flights to transport meals, water, generators, and tarps.

National Guard conducting a mission to deliver 2,000 gallons of diesel fuel to San Juan Capestrano Hospital.

The National Protection and Programs Directorate reported as of Sept. 30, that 13 percent of Puerto Rico and 30 percent of US Virgin Islands cell sites are operational.

OCT 2

US Army Corps of Engineers continues to clear debris from the U.S. Virgin Islands roadways. They are continuing debris clearance for Puerto Rico roadways, with 20 miles of assigned roads cleared.

The government of Puerto Rico estimates that power has been restored to at an estimated 5.4 percent of customers in Puerto Rico.

All ports in the US Virgin Islands open or open with restrictions.

OCT 3

US Dept. of Health and Human Services medical teams have seen more than 425 patients in Puerto Rico and more than 100 patients in the US Virgin Islands.

OCT 4

According to the Puerto Rico Aqueduct and Sewer Authority, an estimated 49% of Puerto Rico has potable water restored.

The government of Puerto Rico estimates that power is restored to at least 8.6% of customers in Puerto Rico.

OCT 5

American Red Cross distributed more than 381,000 relief items to survivors in the US Virgin Islands and Puerto Rico and has provided more than 7,700 mental health and health services to people in need.

US Postal Service reports that all incoming mail service is available to Puerto Rico and the US Virgin Islands.

The Federal Communications Commission continues to monitor the status of communications networks in the areas affected by Hurricane Maria.

Social Security Administration checks are being delivered daily to San Juan, Puerto Rico, where beneficiaries can pick them up at all 120 post offices.

OCT 6

Power is restored to at least 10.7% of customers in Puerto Rico and approx. 10.5% of customers on St. Thomas have been restored.

Critical facilities, including the airports and hospitals have been restored on both St. Thomas and St. Croix.

With all 17 priority dam inspections complete, the PA National Guard is scheduled to place 900 super sandbags in and around the Guajataca Dam spillway, working with the Army Corps of Engineers to stabilize the dam.

National Park Service personnel securing museum collections located at St. Croix and St. John.

OCT 7

US Geological Survey has repaired 30 water monitoring gauges in Puerto Rico.

Telecommunications service has been restored to approximately 58% of customers in Puerto Rico.

Power is restored to at least 11.7% of customers in Puerto Rico and approx. 14.4% of customers on St. Thomas have been restored and 12% on St. Croix.

OCT 8

More than 680 American Red Cross volunteers are on the ground in Puerto Rico and the US Virgin Islands. The ARC has completed more than 11,300 mental health and health contacts.

US Northern Command conducted 23 flights to transport meals, water, fuel, generators, and tarps.

The USNS Comfort has treated 78 patients.

The 26th Marine Expeditionary Unit is currently conducting central route clearance today in order to open up roadways into the interior of Puerto Rico.

OCT 9

14th Combat Support Hospital arrives to increase the medical capacity in Puerto Rico.

All ports in Puerto Rico open or open with restrictions.

OCT 10

US Dept. of Health and Human Services and US Dept. of Defense personnel are staffing mobile medical facilities in St. Croix and St. Thomas.

OCT 11

HURRICANE MARIA
FEDERAL RESPONSE TIMELINE
OCT 15 *through* OCT 23

OCT 15

US Dept. of Defense uses both ground and air assets to deliver supplies to central regions of Puerto Rico.

The National Guard deployed more than 5,500 guardsmen to restore communication, and electrical power as well as providing medical assistance and supporting local law enforcement.

OCT 16

US Postal Service begins Sunday mail services, which covered most of Puerto Rico and the US Virgin Islands.

OCT 17

US Army Corps of Engineers has completed more than 460 generator assessments, 359 generator inspections, and 106 temporary generator installations.

OCT 18

The Social Security Administration opens three offices in Puerto Rico -- San Juan, San Patricio and Caguas -- with 57 employees returning to work.

US Dept. of Health and Human Services has provided medical treatment to more than 8,700 patients in Puerto Rico and more than 1,500 in the US Virgin Islands.

U.S. Army Corps of Engineers announces the installation of 2 new 50 MW generators at the Palo Seco power plant to help stabilize power in the San Juan metro area.

OCT 19

A baby is born on the USNS Comfort.

More than 10,000 cubic yards of debris removed.

More than 16,500 federal, civilian, and military personnel and 74 voluntary agencies in Puerto Rico.

OCT 20

To date, 10 schools have reopened in the St. Thomas/St. John School District and more than 2,800 students and 271 teachers have returned to the classroom.

FEMA recovery specialists are at four Disaster Recovery Centers in St. Croix and St. Thomas to help residents face to face with information and questions about their registration.

US Dept. of Health and Human Services has more than 500 personnel from the National Disaster Medical System and US Public Health Service deployed to Puerto Rico.

OCT 21

Nearly 2,000 medical staff are supporting Puerto Rico's medical mission, making this one of the largest medical missions in recent history.

Two Disaster Recovery Centers are open in Puerto Rico.

OCT 22

100% of pharmacies open and processing prescriptions in Puerto Rico.

According to the Puerto Rican power utility PREPA (also known as AEE), power has been restored to 20.22% of the power grid.

OCT 23

71.58% of clients have potable water service (based on Puerto Rico Aqueduct and Sewer Authority clientele).

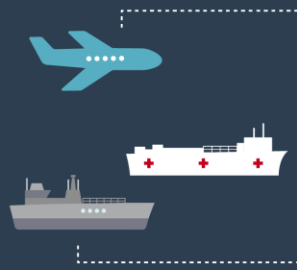
More than 22,166 cubic yards of debris has been removed in Puerto Rico.

FEMA

SNAPSHOT *for* HURRICANE MARIA

PUERTO RICO | 10/16/2017 AT 12 PM

MORE THAN
17,500
FEDERAL CIVILIAN PERSONNEL & MILITARY SERVICE MEMBERS



100% AIRPORTS OPEN (OR OPEN WITH RESTRICTIONS)*

100% *Federally maintained* PORTS OPEN (OR OPEN WITH RESTRICTIONS)*

72% ↑ 9%
ACCESS TO POTABLE WATER*
(ADDITIONAL WATER IS BEING PROVIDED VIA BOTTLED AND BULK WATER)

13%
CUSTOMERS WITH ELECTRICITY* ↑ 4%

TEMPORARY POWER**
For critical infrastructure
113 GENERATOR INSTALLS COMPLETED
462 ASSESSMENTS REQUIRED

86%
SUPERMARKETS OPEN*

79%
RETAIL GAS STATIONS OPERATIONAL*

59% ↑ 3%
TELECOMMUNICATION SERVICE*
Wired and wireless

BLUE ROOF INSTALLATIONS**
439 INSTALLS COMPLETED
3,700+ RIGHT OF ENTRY AGREEMENTS COLLECTED TO DATE

95% ↓ 2%
HOSPITALS OPEN

DEBRIS CLEAN-UP**
By USACE
CUBIC YARDS IDENTIFIED:
6.2 MILLION
CUBIC YARDS REMOVED:
7,367

*DATA SOURCE: WWW.STATUS.PR | **DATA SOURCE: USACE
ALL OTHER DATA FROM FEMA | PERCENT DIFFERENCE BASED ON 10/13/17 STATS

FEMA
US Army Corps of Engineers.

FEMA

UPDATE
HURRICANE MARIA

FEMA RESPONSE IN PUERTO RICO

The amount of debris could fill
YANKEE STADIUM
7x's

4th largest CARGO PLANE IN THE WORLD used to transport critical generators

DELIVERED PER DAY
742 THOUSAND LITERS OF WATER
600 THOUSAND MEALS PROVIDED

42,000 TARPS DISTRIBUTED
439 NUMBER OF BLUE ROOFS

100% POSTAL SERVICE
100% AIRPORTS OPEN
100% SEAPORTS OPEN (OR OPEN WITH RESTRICTIONS)

6100 PATIENTS SEEN AT HOSPITALS
61% TELECOMMUNICATIONS RESTORED
65%+ RUNNING WATER (PRASA)
3.6 MILLION GALLONS/DIESEL
128,997 GALLONS GASOLINE

LARGEST USACE TEMP POWER MISSION IN HISTORY

31 PLANES
89 HELICOPTORS
29 CUTTERS

4 NAVAL VESSELS
MORE THAN **700 AIR DROPS**
Longest sustained air drop mission

10+ MILLION LITERS OF BOTTLED WATER
3.6 MILLION GALLONS OF WATER

134 GENERATORS INSTALLED > (HARVEY, IRMA COMBINED INSTALLATIONS)

MORE THAN **16,500** FEDERAL CIVILIAN PERSONNEL & MILITARY SERVICE MEMBERS

ONE OF THE LARGEST FEDERAL MEDICAL RESPONSE MISSIONS IN THE U.S.

97,500 lbs PET FOOD
1 Baby BORN USNS COMFORT
MEDICAL CARE **100** PATIENTS CARED FOR USNS COMFORT
MORE THAN **74** VOLUNTEER ORGANIZATIONS

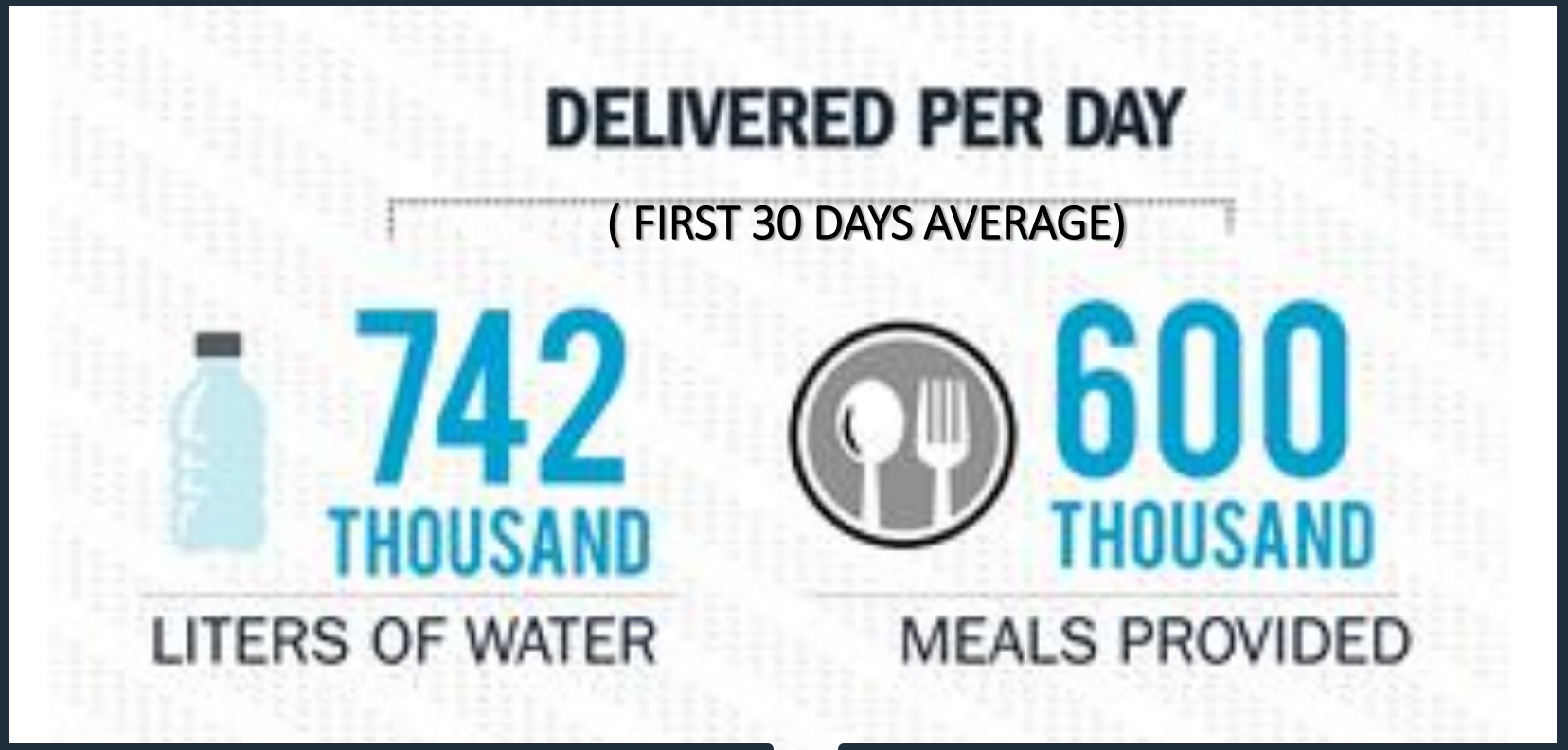
as of October 19

3.6 MILLION

GALLONS/DIESEL

128,997

GALLONS GASOLINE



27,206 TONS / DAY

IF MREs @ 1.5 LBS PER

15,000 TONS / DAY

“BLUE SKY” SUPPLY RATE

3,013 TONS / DAY

MORE THAN

17,500

FEDERAL CIVILIAN PERSONNEL & MILITARY SERVICE MEMBERS

DELIVERED PER DAY

742 THOUSAND LITERS OF WATER

600 THOUSAND MEALS PROVIDED

31 PLANES

89 HELICOPTORS

29 CUTTERS

4 NAVAL VESSELS

MORE THAN **700 AIR DROPS**

Longest sustained air drop mission

10+ MILLION LITERS OF **BOTTLED WATER**

3.6 MILLION **GALLONS OF WATER**

DEBRIS CLEAN-UP**

By USACE

CUBIC YARDS IDENTIFIED:

6.2 MILLION

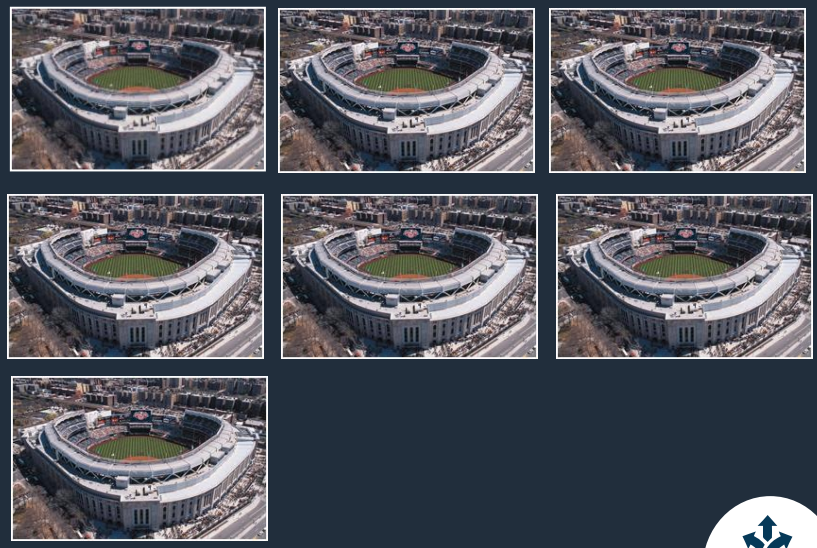
CUBIC YARDS REMOVED:

7,367

The amount of debris could fill

YANKEE STADIUM

7x's



REFERENCES

MASS CARE, FOOD & WATER (MASS CARE)

1. Hawaii County Emergency Operations Plan, Appendix 8 to Annex H: Public Health and Medical Services (2012)
2. Hawaii County Emergency Operations Plan, Appendix 9 to Annex H: Search and Rescue (2012)
3. Hawaii County Emergency Operations Plan, Appendix 10 to Annex H: Oil and Hazardous Materials Response (2012)
4. Hawaii County Mass Fatality Management Plan (2012)
5. Maui County Emergency Operations Plan, Annex I: Fire and Rescue (2010)
6. Maui County Emergency Operations Plan, Annex L: Health and Medical (2010)
7. Maui County Mass Fatality Management Plan (2012)
8. City and County of Honolulu Emergency Operations Plan, Annex I: Fire and Rescue (2006)
9. City and County of Honolulu Emergency Operations Plan, Annex L: Health and Medical (2006)
10. Honolulu County Mass Fatality Management Plan (2012)
11. Kauai County Emergency Operations Plan, Annex I: Fire and Rescue (2008)
12. Kauai County Emergency Operations Plan, Annex L: Health and Medical (2008)
13. Kauai County Mass Fatality Management Plan (2012)
14. State of Hawaii DOH All-Hazards Emergency Response Plan (2013)
15. State of Hawaii Threat and Hazard Identification and Risk Assessment (2013)
16. HAH Public Health Emergency Preparedness Site Visit Presentation (2013)
17. 2014 Hawaii Catastrophic Hurricane Scenario Annex Infrastructure Questionnaire Response (2014)
18. Hawaii Department of Human Services

REFERENCES

MEDICAL (PERFORMING LIFE SAVING MEASURES)

1. Hawaii County Emergency Operations Plan, Appendix 8 to Annex H: Public Health and Medical Services (2012)
2. Hawaii County Emergency Operations Plan, Appendix 9 to Annex H: Search and Rescue (2012)
3. Hawaii County Emergency Operations Plan, Appendix 10 to Annex H: Oil and Hazardous Materials Response (2012)
4. Hawaii County Mass Fatality Management Plan (2012)
5. Maui County Emergency Operations Plan, Annex I: Fire and Rescue (2010)
6. Maui County Emergency Operations Plan, Annex L: Health and Medical (2010)
7. Maui County Mass Fatality Management Plan (2012)
8. City and County of Honolulu Emergency Operations Plan, Annex I: Fire and Rescue (2006)
9. City and County of Honolulu Emergency Operations Plan, Annex L: Health and Medical (2006)
10. Honolulu County Mass Fatality Management Plan (2012)
11. Kauai County Emergency Operations Plan, Annex I: Fire and Rescue (2008)
12. Kauai County Emergency Operations Plan, Annex L: Health and Medical (2008)
13. Kauai County Mass Fatality Management Plan (2012)
14. State of Hawaii DOH All-Hazards Emergency Response Plan (2013)
15. State of Hawaii Threat and Hazard Identification and Risk Assessment (2013)
16. HAH Public Health Emergency Preparedness Site Visit Presentation (2013)
17. 2014 Hawaii Catastrophic Hurricane Scenario Annex Infrastructure Questionnaire Response (2014)
18. Hawaii Catastrophic Hurricane, Public Health and Medical Estimate Report (September 2014)

REFERENCES

FUEL PRODUCTS

1. Hawaii Ports Handbook
2. MTSRU
3. State DOT Meeting Minutes
4. Critical Transportation Core Capability Analysis
5. State of Hawaii, DBEDT Energy Trend Analysis
6. Hawaii Energy Assurance Plan March 2013
7. Hawaii refinery Task Force – Refinery Closure Report Nov. 15, 2013
8. US Department of Energy
9. Hawaii Hurricane Catastrophic Plan
10. Interviews with Department of Business, Economic Development and Tourism (2016)

REFERENCES

POWER

1. Kauai Island Utility Cooperative 2013 Annual Report
2. Hawaiian Electric Company Operational Capabilities Overview Brief
3. Hawaii Electric Light Transmission Lines Map (2014)
4. Hawaiian Electric Companies 2013 Integrated Resource Planning Report
5. Maui Electric Company Emergency Operations Procedures
6. Interviews with Department of Business, Economic Development and Tourism, Energy Analysts (2016)

REFERENCES

PORTS

OFFICIAL REPORTS:

1. 2013 Hawaii Port Resiliency/Recovery Assessment Summary Report
2. 02/2015 HDOT: Vulnerability of Hawaii Commercial Port and Harbor Facilities to Tsunamis and Hurricane Storm Surge and Wave Action, Ian Robertson Ph.D, SE, U of H Manoa
3. 12/2015 Department of Homeland Security: Resiliency Assessment
4. FEMA Honolulu Harbor Workshop, Summary Report (2016)
5. 03/2016 Hawaii DoD: HAWAII Port-Wide Risk Management and Mitigation Plan
6. 04/2016 USCG: Sector Honolulu: Laydown Area MTSR Workshop 2016 AAR
7. 06/2006 Mississippi Legislature Report: The Impact of Hurricane Katrina on Mississippi's Ports
8. 08/2017 Tsunami Assessment of the Port of Honolulu: Gary Chock, Martin & Chock, Inc.

Interviews and Other Sources:

1. Hawaii Ports Handbook
2. MTSRU Meeting Minutes
3. State DOT Meeting Minutes
4. Critical Transportation Core Capability Analysis
5. Section 20 of the River and Harbor Act of 1899 (33 USC 409, 411-415)
6. Interviews with John Manganaro, Port Security Specialist, USCG
7. Airport capabilities interviews with Joint Base Hickam: Dan Dubois, Emergency Management Officer;
8. Airport capabilities interviews with HDOT: Airports: Steven Maruyama, Chief Martinez, Hank Bruckner
9. State DOT Harbors: Planners and USACE Interviews: 8/29/2016

CONTACT INFORMATION

MR. DAVID LOPEZ

Critical Systems & Logistics

HAWAII EMERGENCY MANAGEMENT
3949 Diamond Head RD
Honolulu, HI 96816-4494

Off: 1808.733.4301 ext 514
Mob: 858.231.7562

david.a.lopez@